Remarks: Examination Report

It is submitted that with the amended claims herein, the objections raised against the claims are overcome.

Applicant's arguments in the 4/18/2005 amendment with respect to claims 97-99, 102-109, 111, 122-124, 127-134, and 136 were not considered persuasive.

Regarding claims 97-99, the Examiner states that no definition of the carrier interferometry signal is stated in the claims. Therefore, claims 97-99 were amended to include a definition of a particular carrier interferometry signal in order to better distinguish the claimed invention over the prior art.

In particular, claims 97-99 now recite receiving at least one data symbol spread by at least one carrier interferometry (CI) code across a plurality of multi-frequency carriers, the CI code configured to map the at least one data symbol to at least one pulse waveform produced by a superposition of the plurality of multi-frequency carriers and centered at a predetermined instant in time. The added limitations reciting spreading the data across the carriers and producing the pulses from the carriers (rather than just from the data) distinguishes the claims 97-99 over Posner.

Posner does not teach spreading data symbols over carriers. Instead, Posner's multicarrier signal comprises independently modulated carriers (abstract).

Posner takes information on an existing multicarrier signal having independently modulated carriers and maps the amplitude fluctuations (i.e., the envelope) of the multicarrier signal to duty-factor variations of a constant-amplitude pulse train at a sampling rate at least an order of magnitude higher in frequency than the maximum frequency of the envelope (col. 3, lines 27-32). Since the pulse train has constant amplitude, and the pulse-time modulation of the pulse train does not change the pulse train's amplitude, the resulting low-dynamic-range signal can be amplified using a

nonlinear amplifier (col. 3, lines 35-46). However, as a result of using a high sampling rate to convert the envelope amplitude information to duty-factor variations of a pulse train, spurious sidebands are added to the original spectrum of the multicarrier signal (col. 9, line 8-14). In effect, Posner adds more information to the original multicarrier signal in order to reduce the dynamic range of the envelope. Thus, after amplification, a narrowband output filter 24 is used to strip off the sampling sidebands (col. 5, lines 61-64). In the time domain, this narrowband filtering smoothes the duty-factor variations of the pulse train in order to re-synthesize the original signal envelope. Since the resulting transmitted signal is identical to the original multicarrier signal, no modifications need to be made to the receiver (col. 5, lines 64-65).

Posner does not teach to spread information across carriers. Rather, the output multicarrier signal is the same as the input multicarrier signal, which has independently modulated carriers (abstract). Furthermore, Posner's intermediate steps do not spread information across multiple carriers. Rather, Posner adds more information by adding sidebands (which are shown in FIG. 9), which result from using a high sampling rate to convert the envelope amplitude information to duty-factor variations of the pulse train (col. 9, line 8-14). This added information does not constitute spreading. Furthermore, the added information is then removed via narrowband filtering prior to transmission (col. 5, lines 61-64).

Posner does not teach a pulse waveform constructed from a superposition of multi-frequency carriers. Posner teaches to derive pulse modulations (e.g., the duty factor) from the envelope amplitude, not from the carriers themselves (col. 3, line 63- col. 4, line 1). Posner's pulses (including the pulse-repetition rate) are not synthesized from a superposition of the carriers. Pulse characteristics, such as the repetition rate (col. 3, lines 63-67), are derived ***approximately*** from the information (e.g., Posner states, "the repetition rate is ***at least an order of magnitude higher*** than a maximum envelope bandwidth"). Conversely, pulses produced by a superposition of multi-frequency carriers (such as recited in the amended claims 97-99) have a repetition rate and a duty factor that are defined ***precisely*** by the carriers.

Therefore, the amended claims 97-99 (and corresponding dependent claims 122-124) should be found patentable under 35 U.S.C. 102(b).

Regarding claims 102 and 103, the Examiner stated that Posner discloses pulses modulated with data symbols, a pulse train, and a pulse function operating on the signal. Claims 102 and 103 were amended to better distinguish the claimed invention over the prior art. Specifically, language was added to the claims to recite spreading the data symbols over the carrier frequencies. Furthermore, language was added to recite the pulse function comprising a superposition of the carrier frequencies. The added limitations reciting spreading the data across the carrier frequencies (instead of processing independently modulated carriers) and producing the pulse function from the carrier frequencies (rather than just from the data) distinguishes claims 102 and 103 over Posner, such as discussed with respect to the claims 97-99.

Therefore, the amended claims 102 and 103 (and corresponding dependent claims 127 and 128) should be found patentable under 35 U.S.C. 102(b).

Regarding claims 104-106, the Examiner states that no definition of the carrier interferometry signal is provided in the claims. Therefore, claims 104-106 were amended to include language that recites spreading data across multiple carriers with respect to a particular type of carrier interferometry coding in order to better distinguish the claimed invention over the prior art. The added limitations that recite spreading the data across the carriers and producing the pulses from the carriers (rather than just from the data) distinguishes the claims 104-106 over Posner, such as described with respect to the claims 97-99.

Therefore, the amended claims 104-106 (and corresponding dependent claims 129-131) should be found patentable under 35 U.S.C. 102(b).

Regarding claims 107-109, the Examiner states that Posner discloses values of the pulse sequence (in particular, the duty cycle) being equal to the information values and that the pulse train represents envelop amplitude information (col. 3, lines 27-32). The amended claims 107-109 now include language that recites spreading data across multiple carriers to distinguish the claimed invention over the prior art. The added limitation of spreading the data across the carriers distinguishes the claims 107-109 over Posner (which recites using independently modulated carriers), such as discussed with respect to the claims 97-99. Furthermore, language in the amended claims recites producing pulses from the carriers and applying the pulses to the data, whereas Posner describes the pulses being generated from parameters other than carrier signals (e.g., col. 3, line 63-col.4, line 1 recites a pulse train with a repetition rate "at least an order of magnitude higher than a maximum envelope bandwidth" and a duty factor based on amplitude information from the source signal).

Therefore, the amended claims 107-109 (and corresponding dependent claims 132-134) should be found patentable under 35 U.S.C. 102(b).

Conclusion

The Applicant submits that every effort has been made to address the Examiner's objections and that the Application is now in condition to proceed to grant.

Yours Respectfully,

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